Hydropower

Despite receiving little attention within the United States, the global hydropower industry is poised to install a staggering amount of new capacity by the end of the decade. Unfortunately, the international competitiveness of U.S.-based technology suppliers in the sector remains minimal. Five foreign manufacturers dominate the turbine market, with most development utilizing "large hydropower" technologies, an area of distinct U.S. weakness. U.S. exporters enjoy a more competitive position in the "small hydro" market, particularly when projects are constructed closer to the United States.

Taken together, large and small hydropower capacity globally exceeds all other renewable energy sources combined. Total installed capacity worldwide now exceeds 800 GW with new large hydro installations occurring almost exclusively in developing markets.

Based on industry projections, ITA expects the global hydropower industry to cumulatively install over 300 GW of new capacity outside the United States between now and the end of the decade. The sector is projected to account for nearly half of all renewable energy development in that time frame.

U.S. Hydropower Industry Export Base

The United States has the third largest installed hydropower capacity of any country in the world behind China and Brazil.[73] Today, the sector accounts for 79 GW of power capacity in the United States – the second largest source of non-fossil fuel generation behind nuclear power.[74]

Yet since the 1960s, major hydropower development has essentially stopped. The United States has not commissioned a new large hydropower dam in well over a generation. Only three percent of domestic hydropower capacity has been installed since 1990, with just 1 GW of new capacity added since 2000.[75] Most forward-looking domestic capacity growth is expected to occur in the form of efficiency improvements at existing dams and the installation of power generating equipment at small dams that were constructed for some other purpose – i.e., river navigation, flood control, etc.

As a result, the global hydropower industry's expansion over the next several years will largely occur without the involvement of U.S. exporters. In fact, according to ITA's projections, U.S. exporters will capture just one percent of the global import market. Anecdotal evidence suggests that this number could be slightly higher for service exporters, who often compete more effectively overseas.

Overview of Global Export Market Opportunities

Over the next two years, ITA expects the world to install 44 GW of new hydropower capacity outside the United States, trailing both wind and solar in terms of global development. However, the industry is expected to install 300 GW of new capacity through 2020, with most development occurring in emerging markets – far more than either the wind or solar sectors.

China will account for the vast majority of the world's investment in large hydropower. Driven by increasing power demand and a need to reduce the carbon

Figure 1: Near-Term Hydropower Export Markets (2015-2016)

1. **Canada**
   (large market; large share)
2. **Chile**
   (small market; large share)
3. **South Africa**
   (small market; small share)
4. **Sudan**
   (large market; small share)
5. **Spain**
   (small market; small share)
6. **Thailand**
   (large market; small share)
7. **Mexico**
   (small market; large share)
8. **India**
   (large market; small share)
9. **Malaysia**
   (small market; small share)
10. **Colombia**
    (large market; small share)

footprint of its power mix, China is expected to install 132 GW of new hydropower by 2020.

China's growth is largely driven by the construction of several large hydropower facilities. Large hydro receives the lion's share of global investment in the sector, accounting for roughly 85 percent of total new capacity brought online last year.[76] In total, there are currently 44 mega-hydropower plants under development in China, each with more than 1 GW of planned capacity.

Almost all of new large hydropower projects regardless of location will be supplied with turbines from one of five dominant turbine producers.[77] European producers Andritz (Austrian), Alstom (French), and Voith (German) should continue dominate turbine sales outside of China, while Dongfang Electric and Harbin Electric will likely capture almost all turbine contracts in China. As a result, hydropower exports are expected to account for just 22 percent of U.S. clean energy exports through 2016 despite the hydropower industry accounting for 65 percent of the value associated with clean energy development during that time period.

The Hydropower Export Opportunity in the Near-Term

While the United States does not enjoy a competitive position within the large hydro market, the three dominant European turbine suppliers all have some manufacturing capacity in the United States and often export from their U.S. facilities to projects in Canada and Latin America. In fact, despite limited growth compared to other markets, Canada again ranks #1 on ITA's list of projected export markets in the sector, matching its ranking in last year's report.

ITA expects Canada to install roughly 3.7GW of new hydropower capacity over the next two years, with U.S. suppliers capturing roughly 11 percent of the value associated with this development. More than two-thirds of hydropower exports in the near-term are expected to go to Canada, with no other market capturing more than 3.5 percent of total hydropower exports. By contrast, China – the largest hydropower market over both the short-and-medium-term – will account for less than one percent of U.S. exports, and ranks 19th in this year's *Top Markets Report* subsector ranking.

Unlike other renewable energy sectors, ITA's hydropower rankings are impacted significantly by the potential construction of one or two massive hydropower projects in certain countries. For example, Sudan ranks #4 on ITA's list of top export markets through 2016, but falls to #10 in the mid-term thanks to one large expected project to be completed in the next two years (a 320 MW dam).

While large hydro projects do not offer U.S. exporters a likely opportunity, the United States does possess a strong small hydro industry (generally defined as supporting projects below 30 MW). The industry often produces power for off-grid communities, small towns along rivers, and generates power from existing dams used for other purposes.

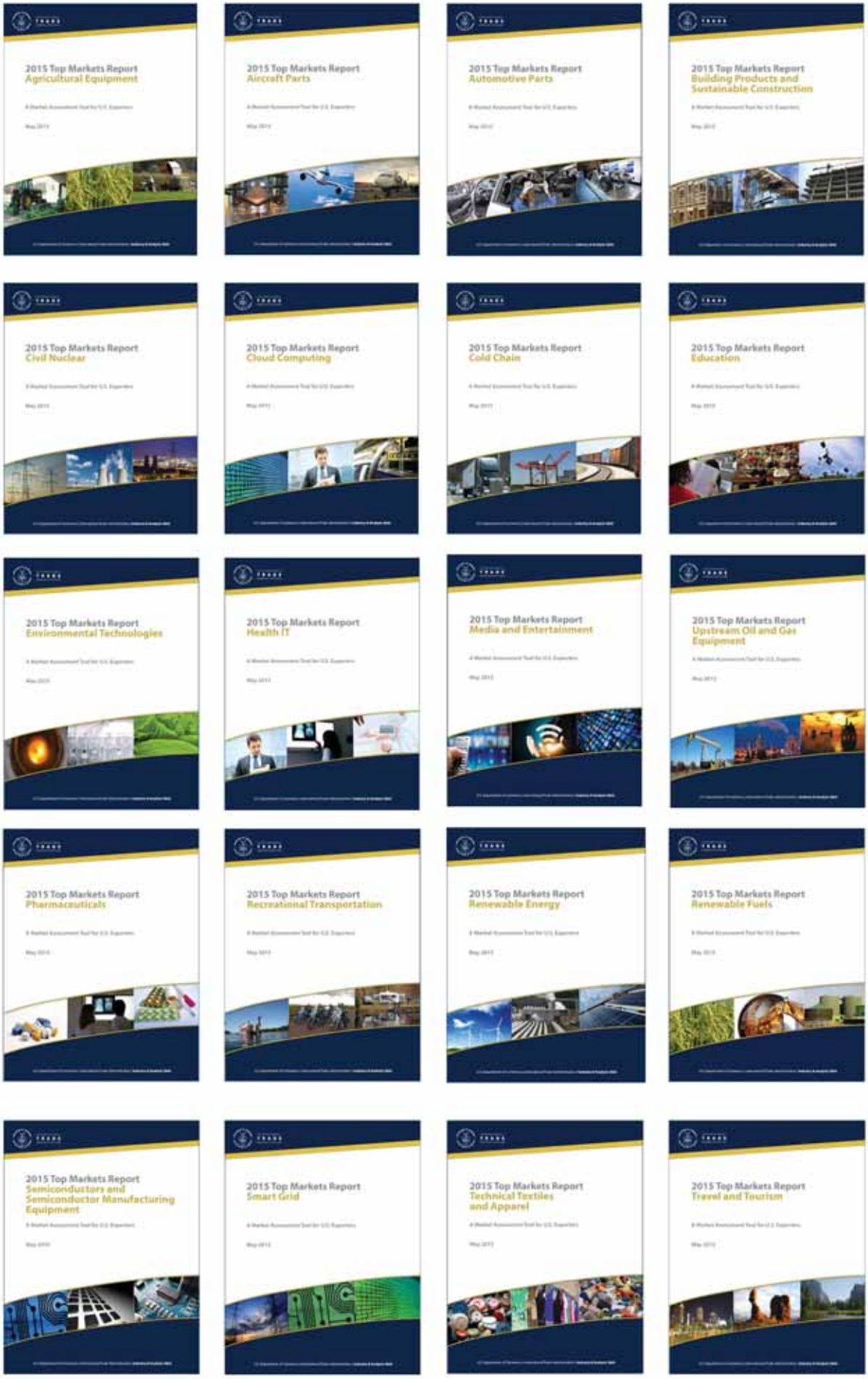
A large slice of the hydropower market is also the addition of existing capacity at existing dam facilities, which often requires considerable engineering expertise. Several U.S. firms excel in this subsector and should benefit from capacity upgrades globally.

Planning for the Long-Term

Over the medium-term, ITA expects Thailand and the United Kingdom to become key players in the hydropower market. Thailand is projected to install 20 GW of new hydropower capacity, trailing only China and Brazil. Though U.S. companies are not well positioned to take advantage of the opportunity, U.S. suppliers enjoy some market share already, indicating that this development should support exports in a sector that often fails to compete successfully abroad.

In the United Kingdom (UK), wave and tidal energy companies should find export opportunities, as development is expected to be strong beginning around 2016. In fact, as full commercialization of wave and tidal energy is achieved (likely towards the end of the decade), several U.S. companies should be able to compete effectively in the UK.

Additionally, many U.S. companies are already developing small run-of-river technologies that are more environmentally sustainable than traditional dams and can produce power for rural, off-grid projects.



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